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Separation of internal and external fields : a new technique of data screening

by

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SEPARATION OF INTERNAL AND EXTERNAL FIELDS : A NEW TECHNIQUE OF DATA SCREENING.

by

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OBJECTIVE

Separation of the internal part of the magnetic field from its external part is the first operation to perform on magnetic data. It is important in order to make comparative or statistical studies of the results to retain as much data as possible and in the same time to eliminate the smallest possible external variations to take fully advantage of the good precision reached by MAGSAT Data.

BACKGROUND

Whatever their origin, time variations with a time constant longer than a year are taken into account using low order polynomials. The variation with a time constant shorter than a year are of three types : the daily variation (S_R), the perturbation caused by field aligned currents and the transient variations. at subauroral latitude. This orbit of MAGSAT is such that the effect of S_R is almost negligible : at ground level in the winter (North) hemisphere this effect is smaller than 5 nT. In a first step field perturbations from field aligned currents will be eliminated by taking only the data between ±50° latitude.

RECENT ACCOMPLISHMENTS

The classic method for eliminating transient variation at subauroral latitude consists in rejecting the "non quiet data" (usually data measured when $Kp \geq 2_0$).

Instead of using the Kp index we decided to use the Km index (for an exhaustive comparison of the two indices see Mayaud, 1980). To build the Km index, the surface of the Earth is divided in 8 sectors (5 in the North and 3 for the South hemisphere). Each sector is defined by two or three magnetic observatories (see Table 1) and its geographic limits are also given in Table 1.

Figure 1 illustrates the technique we set up : for each three hourly interval we draw the MAGSAT track on a map showing the location of the station (the crosses), the limits of the sector and the value of the mean K index inside each sector. No figure in a sector means that the activity level in this sector is lower than 5 nt, in a sector covered with number 1, the activity lies between 5 and 20 nT, 2 stands for any level greater than 20 nT. As shown by Mayaud, 1980, the Km network is such that these figures are an over-estimate of the activity level in each sector (except of course around the auroral zone). Figure 1 comes from the catalog we

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made for the first two months of MAGSAT data.

FUTURE EMPHASIS

We will extend the present catalog to all MAGSAT data available and use it the following way : after decimating and averaging the data, we will assign each datum an index value which depend on the magnetic situation and the position of the point.

R E F E R E N C E

MAYAUD, P.N., 1980. Derivation, Meaning and Use of Geomagnetic Indices, A.G.U., Geophysical Monograph Series.

TABLE 1

NORTH HEMISPHERE

Limit 1 = 195°

MAGADAN	60°07'	151°01'
PETROPAVLOSK	53°06'	158°38'
MEMAMBETSU	43°54'	144°12'

Limit 2 = 110°

PODKAMMENAYA	61°36'	90°00'
SVERDLOVSK	56°44'	60°38'

Limit 3 = 35°

WITTEVEEN	52°49'	06°40'
HARTLAND	50°59'	355°31'
NIEMEGK	52°04'	12°40'

Limit 4 = 325°

OTTAWA	45°24'	284°27'
FREDERICKSBURG	38°12'	282°38'

Limit 5 = 265°

NEWPORT	48°16'	242°53'
VICTORIA	48°31'	236°35'
TUCSON	32°15'	249°10'

SOUTH HEMISPHERE

Limit 1 = 230°

EYREWELL	-43°25'	172°21'
TOOLANGI	-37°32'	145°28'
GNANGARA	-31°47'	115°57'

Limit 2 = 90°

KERGUELEN	-49°21'	70°12'
CROZET	-46°26'	51°52'
HERMANUS	-34°25'	19°14'

Limit 3 = 350°

ARGENTINE ISLAND	-65°12'	295°42'
SOUTH GEORGIA	-54°17'	323°31'
TRELEW	-43°15'	294°41'

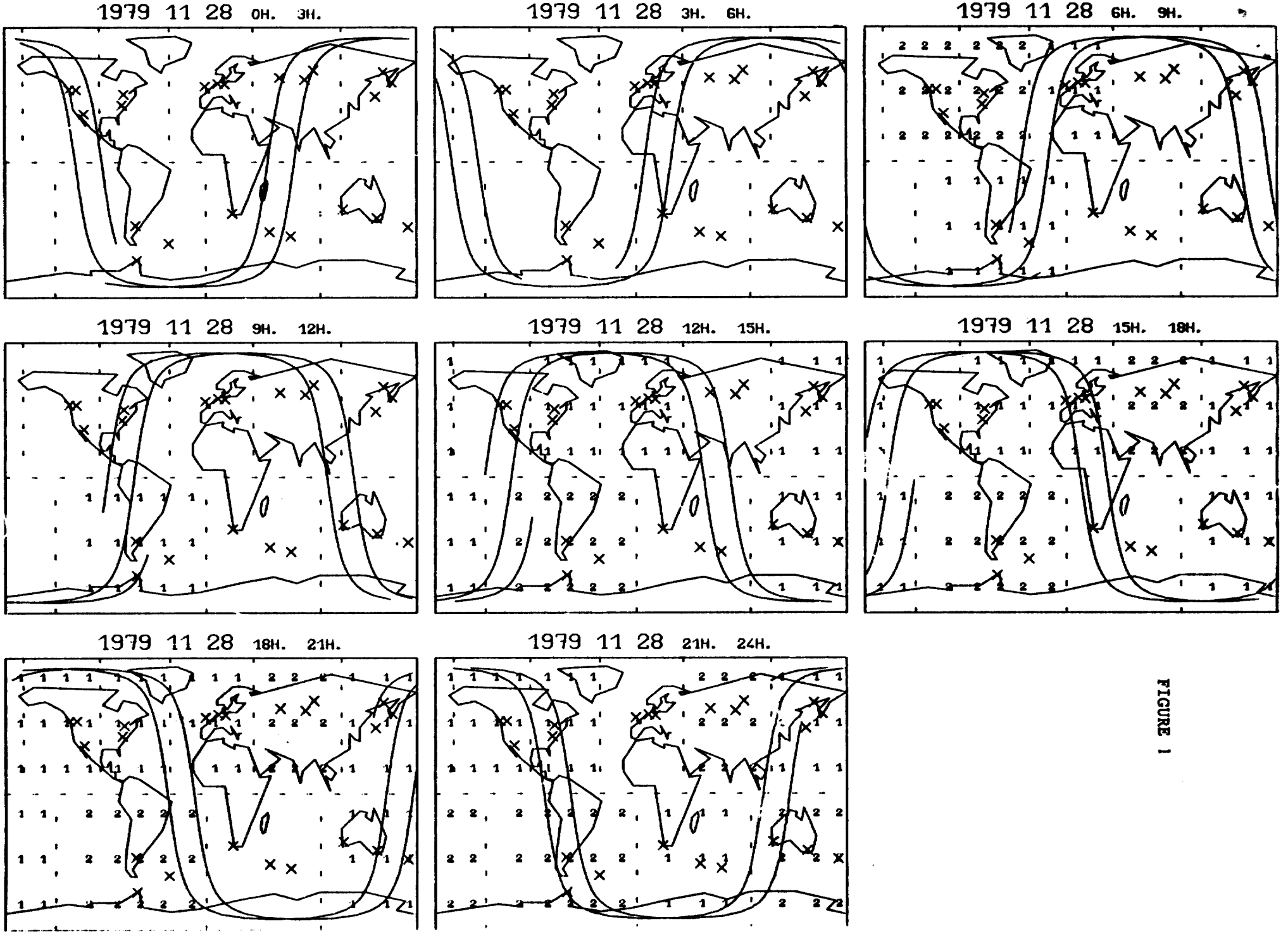
1979 11 28 0H. 3H.
1979 11 28 3H. 6H.
1979 11 28 6H. 9H.
1979 11 28 9H. 12H.
1979 11 28 12H. 15H.
1979 11 28 15H. 18H.
1979 11 28 18H. 21H.
1979 11 28 21H. 24H.

FIGURE 1